

3.13-3.15  
Quiz Review

key 47 pts.

Name \_\_\_\_\_ Period \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the component form and magnitude of the indicated vector.

- 1) Given that  $P = (2, 5)$  and  $Q = (-1, 10)$ , find the component form and magnitude of the vector  $\vec{PQ}$ .

1) \_\_\_\_\_

3  $\vec{PQ} = \langle -3, 5 \rangle$   
 $|\vec{PQ}| = \sqrt{(-3)^2 + (5)^2} = \sqrt{34}$

- 2) Given that  $P = (-2, 3)$  and  $Q = (-5, -7)$ , find the component form and magnitude of the vector  $3\vec{PQ}$ .

2) \_\_\_\_\_

3  $3\vec{PQ} = \langle -9, -30 \rangle$   
 $|3\vec{PQ}| = \sqrt{(-9)^2 + (-30)^2} = \sqrt{981} = 3\sqrt{109}$

Find the component form of the indicated vector.

- 3) Let  $u = \langle -6, -3 \rangle$ ,  $v = \langle -4, -7 \rangle$ . Find  $u + v$ .

3) \_\_\_\_\_

2  $\langle -10, -10 \rangle$

- 4) Let  $u = \langle -5, 0 \rangle$ ,  $v = \langle 4, -4 \rangle$ . Find  $-3u + 2v$ .

4) \_\_\_\_\_

2  $\langle 23, -8 \rangle$

Find the unit vector in the direction of the given vector. Write your answer in the indicated form.

- 5) Let  $u = \langle -2, 5 \rangle$ . Find the unit vector in the direction of  $u$ , and write your answer in component form.

5) \_\_\_\_\_

2  $|u| = \sqrt{29}$   $\left\langle \frac{-2}{\sqrt{29}}, \frac{5}{\sqrt{29}} \right\rangle$

- 6) Let  $u = \langle -4, -3 \rangle$ . Find the unit vector in the direction of  $u$ , and write your answer as a linear combination of the standard unit vectors  $i$  and  $j$ .

6) \_\_\_\_\_

2  $|u| = 5$   $\left\langle \frac{-4}{5}, \frac{-3}{5} \right\rangle \rightarrow \frac{-4}{5}i - \frac{3}{5}j$

Find the magnitude and direction angle for the following vector. Give the direction angle as an angle in  $[0^\circ, 360^\circ)$  rounded to the nearest tenth.

3)  $\langle -3, -10 \rangle$

in 3rd quad.

$$\theta = \tan^{-1}\left(\frac{-10}{-3}\right) = 73.3^\circ + 180$$

$$= 253.3^\circ$$

$$|\langle -3, -10 \rangle| = \sqrt{109}$$

Solve the problem.

- 8) A plane is heading due south with an airspeed of 275 mph. A wind from a direction of  $36^\circ$  is blowing at 15 mph. Find the bearing of the plane. (Note that bearings are measured from north, clockwise.) Round results to an appropriate number of significant digits.

$$A = \langle 275 \cos 270^\circ, 275 \sin 270^\circ \rangle = \langle 0, -275 \rangle$$

$$W = \langle 15 \cos 54^\circ, 15 \sin 54^\circ \rangle = \langle 8.82, 12.14 \rangle$$

$$A + W = \langle 8.82, -262.86 \rangle$$

$$\theta = \tan^{-1}\left(\frac{-262.86}{8.82}\right) = -88.08^\circ$$

$$\text{Bearing of plane: } 90 + 88 = 178^\circ$$

- 9) A basketball player shoots the ball with a velocity of 15 ft/s at an angle of  $38^\circ$  with the horizontal. To the nearest tenth, find the magnitude of the horizontal component of the resultant vector.

$$x = 15 \cos 38^\circ = 11.8 \text{ ft.}$$

10)  $a = \langle 3, -7 \rangle$ ,  $b = \langle -8, 5 \rangle$

$$(3)(-8) + (-7)(5) = -59$$

Find the angle between the given vectors to the nearest tenth of a degree.

11)  $u = \langle -4, 2 \rangle$ ,  $v = \langle 8, 4 \rangle$

$$\theta = \cos^{-1}\left(\frac{-24}{\sqrt{20.80}}\right) = 126.9^\circ$$

12)  $u = 2i + \sqrt{7}j$ ,  $v = -i - 3j$

$$\theta = \cos^{-1}\left(\frac{-2 - 3\sqrt{7}}{\sqrt{110}}\right) = 161.3^\circ$$

Determine whether the vectors  $u$  and  $v$  are parallel, orthogonal, or neither.

13)  $u = \langle 4, 0 \rangle$ ,  $v = \langle 0, -12 \rangle$

$$u \cdot v = 0 \text{ orthogonal}$$

14)  $u = \langle 2, -6 \rangle$ ,  $v = \langle 6, -18 \rangle$

$$u \cdot v \neq 0$$

$$3u = v \rightarrow \text{parallel}$$

2 15)  $u = \langle 7, 8 \rangle, v = \langle 10, 8 \rangle$  neither  
 $u \cdot v \neq 0$   
 not parallel

15) \_\_\_\_\_

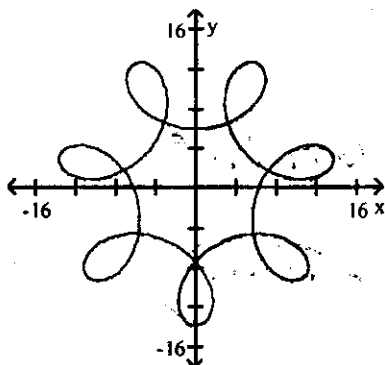
**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

Find the graph of the given parametric equations.

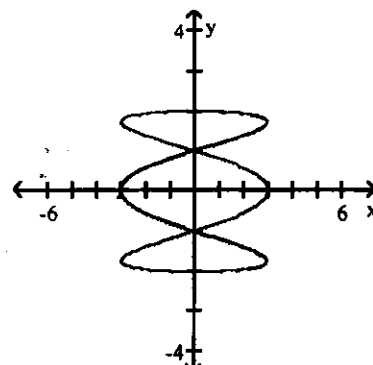
16)  $x = 10 \sin t + 4 \sin 6t, y = 10 \cos t - 4 \cos 6t$

16) A

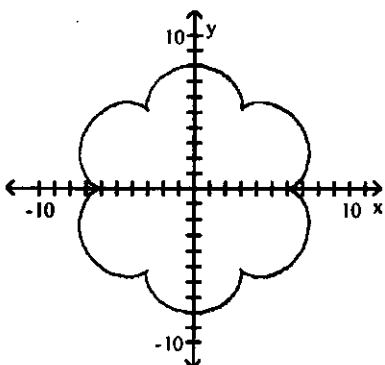
A)



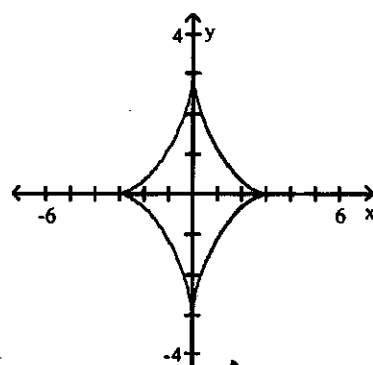
B)



C)



D)



**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question.

Eliminate the parameter.

2 17)  $x = \sqrt{t}, y = 3t - 1$

17) \_\_\_\_\_

$t = x^2$   
 $y = 3x^2 - 1$

2 18)  $x = 2t, y = t + 3$

18) \_\_\_\_\_

$t = \frac{x}{2}$   
 $y = \frac{x}{2} + 3$

Solve the problem using a graphing calculator.

- 19) Estimate the maximum height reached by a baseball during its flight if it is thrown with a velocity of 98 feet per second at an angle of  $52^\circ$  relative to level ground.

19) \_\_\_\_\_

2

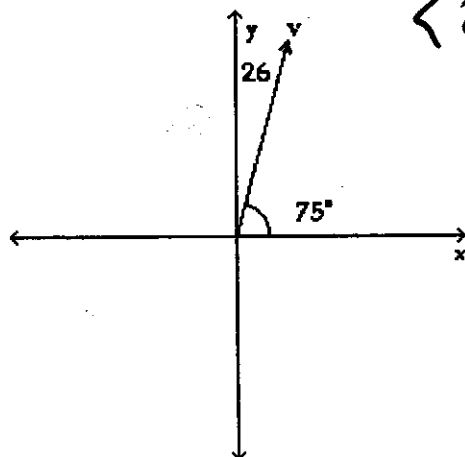
$$y = -16t^2 + (98 \sin 52^\circ)t$$

$$y_{\max} = 93.18 \text{ ft.}$$

Find the component form of the vector  $v$ .

20)

2



$$\langle 26 \cos 75^\circ, 26 \sin 75^\circ \rangle$$

$$\langle 6.73, 25.17 \rangle$$

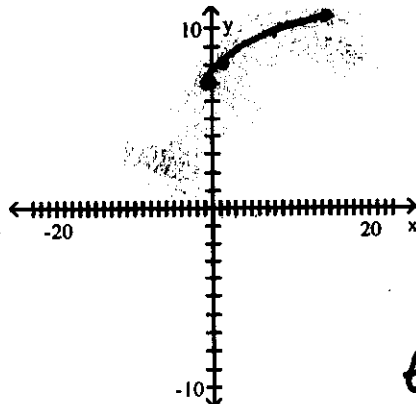
20) \_\_\_\_\_

Graph the pair of parametric equations.

21)  $x = t^2, y = \sqrt{t} + 7, 0 \leq t \leq 4$

21) \_\_\_\_\_

2



t	x	y
0	0	7
1	1	8
2	4	8.414
3	9	8.73
4	16	9

End Points (0, 7) + (16, 9)